Remarks

The Applicants have amended Claim 24 to add "or more" that was inadvertently omitted. Support may be found in the Specification on page 24 at lines 13 – 14.

The Applicants have added new Claims 35 and 36. They are fundamentally based on Claim 15. Claim 35 specifically recites a sheet of inorganic electrically conductive fibers, adhesive imparting material deposited on the sheet of inorganic electrically conductive fibers and expanded graphite particles adhered to the inorganic electrically conductive fibers with the adhesive imparting material such that the sheet of inorganic electrically conductive fibers is contained within the expanded graphite particles. Support for the subject matter that extends beyond original Claim 15 may be found in the Examples, such as in Example 1 wherein a sheet of inorganic electrically conductive fibers formed from a multiplicity of fibers previously immersed in an emulsion of a binder was sprinkled over both opposed surfaces with expanded graphite powder. The resulting sheet of inorganic electrically conductive fibers was clearly contained within the expanded graphite particles applied to its opposed surfaces. With respect to new Claim 36, support may be found throughout the Specification, such as at page 25, wherein a current collector for a fuel cell is disclosed as comprising a porous conductive sheet as a layer and a catalyst layer. Entry of the above amendments and new claims into the Official File is accordingly respectfully requested.

The Applicants have amended Claim 15 to assist in clarifying important aspects of the invention such that those of ordinary skill in the art can readily distinguish what is claimed from selected structures shown and described in the prior art. In that regard, the porous conductive sheet of the invention is used as a layer used in conjunction with a catalyst layer that forms a current collector. A current collector is used as a portion of a fuel cell. Thus, it becomes apparent, when comparing the components of the invention against the prior art, that the claimed porous conductive

sheet is a gas diffusion layer and is not a catalyst layer. A gas diffusion layer and a catalyst layer are entirely different and are used in conjunction with one another. However, they are not interchangeable inasmuch as they have completely different objectives, functions and characteristics. The significance of these differences will be described below with respect to the reasons set forth distinguishing the invention as recited in the solicited claims over any hypothetical combination of JP '897 with JP '265.

The Applicants agree that JP '265 discloses a porous sheet comprising a plurality of expanded graphite particles and a fluoro resin, i.e., a water repellant. However, the analysis must extend one step further. Specifically, the porous sheet of JP '265 comprises expanded graphite particles constituting a gas diffusion layer. This gas diffusion layer does not contain the fluoro resin/water repellant. Thus, there is no disclosure in JP '265 for the use of a binder such as a fluoro resin in the gas diffusion layer. In sharp contrast, JP '265 employs the fluoro resin in the catalyst layer in conjunction with graphite particles to which platinum black is adhered. As a consequence, the fluoro resin of JP '265 simply does not exist in the gas diffusion layer. This is an important difference inasmuch as the gas diffusion layer and catalyst layer are utterly different in objective characteristics and function. It is improper to utilize gas diffusion layers and catalyst layers inter-changeably. They are not interchangeable.

The rejection further takes the position that JP '265 differs from the claimed invention because it does not teach incorporation of inorganic fibers such as carbon fibers into the porous sheet material. The Applicants completely agree. The Applicants also agree that JP '897 discloses short carbon fibers. However, it is of utterly no consequence that the short carbon fibers are incorporated "into a fuel cell body" as set forth in the rejection. What is important is exactly where the short carbon fibers are located in JP '897. This is because the Applicants do not claim that there inorganic

electrically conductive fibers are incorporated into a fuel cell body. In sharp contrast, the Applicants claim that the inorganic electrically conductive fibers are part and parcel of the porous conductive sheet, i.e., the gas diffusion layer.

JP '897, on its face, discloses that the carbon short fibers are located on the surface of the gas diffusion layer and that the conductive carbon fibers intertwined with each other "cover the surface of the gas diffusion layer (4)." Unfortunately, that is not what the Applicants do and not what the Applicants claim. The Applicants actually claim a porous conductive sheet that comprises the inorganic electrically conductive fibers, the adhesive imparting material and the expanded graphite particles. Those three components form the porous conductive sheet/diffusion layer. In sharp contrast, JP '897 teaches that the conductive carbon fibers cover the surface of the gas diffusion layer (4). Those conductive carbon fibers do not comprise the gas diffusion layer. The gas diffusion layer is earlier stated as being comprised of carbon particles and water repellant resin. Thus, even if one of ordinary skill in the art were to make the hypothetical combination of the short carbon fibers of JP '897 with the porous sheet of JP '265, the resulting combination would be a porous sheet/gas diffusion layer of expanded graphite particles (that were previously treated with a pore forming agent) and short carbon fibers covering the surface of that gas diffusion layer/porous sheet. Unfortunately, this would not be the claimed structure and would not even teach or suggest the claimed structure inasmuch as the claimed structure is a porous conductive sheet that includes the inorganic electrically conductive fibers, the adhesive imparting material and the expanded graphite particles. These critical differences alone demonstrate the patentability of the solicited claims irrespective of the hypothetical combination.

There are still other important reasons why the solicited claims are allowable over the hypothetical combination. For example, JP '265 discloses expanded graphite particles in a gas

diffusion layer. However, JP '265 does not teach or suggest that surfaces of the expanded graphite particles are recessed at contact faces between carbon fibers and expanded graphite particles. JP '897 discloses carbon black particles in a gas diffusion layer which is covered by carbon fibers. However, it, too, does not teach or suggest that surfaces of the carbon black particles are recessed at contact faces between the carbon fibers covering the gas diffusion layer and the carbon black particles forming the gas diffusion layer.

The rejection takes the position that expanded graphite is highly deformable and that any pressure would result in the deformation of graphite and, therefore, the sheet of JP '265 would inherently possess this property.

There are at least two problems associated with this portion of the rejection. The first problem is that, even if the hypothetical combination is made, the short carbon fibers of JP '897 cover a surface portion of the gas diffusion layer. This means that the vast majority of expanded graphite particles in the resulting structure would never contact the short carbon fibers and would have no recesses at all. That is not to say that all graphite particles in the claimed invention contact the inorganic electrically conductive fibers. However, by virtue of the fact that the inorganic electrically conductive fibers and the expanded graphite particles comprise the porous conductive sheet/gas diffusion layer of the invention, large portions of the graphite particles contain the claimed recesses. In any event, the hypothetical combination of the short carbon fibers of JP '897 as disclosed as being applied to one surface of the gas diffusion layer would result in the vast majority of the expanded graphite particles not having recesses because they do not contact the short carbon fibers.

In any event, JP '265 simply does not teach or suggest utilization of a highly deformable property of the expanded graphite particles in combination with inorganic electrically conductive

fibers such as carbon fibers. As noted above, this is because JP '265 does not teach or suggest using fibers with expanded graphite particles. Similarly, JP '897 also does not teach or suggest utilization of the highly deformable property since the carbon black particles are not deformed by the carbon fibers.

There is utterly no appreciation for the highly advantageous aspect of the invention discovered by the Applicants that the highly deformable property of the expanded graphite particles prevents the inorganic electrically conductive fibers from being damaged when pressure is applied to the sheet such as when the porous conductive sheet/gas diffusion layer is formed or utilized in conjunction with the formation of a current collector and/or fuel cell. Those functions and results are not only not disclosed or suggested in JP '265 and JP '897, but there is no appreciation for their importance at all. As a consequence, there is no demonstration that the inherency would necessarily flow from the hypothetical combination. In fact, the Applicants respectfully submit that the inherency shown by the hypothetical combination would be that the vast majority of the expanded graphite particles would not have the claimed recesses. Accordingly, the Applicants respectfully submit that the solicited claims are patentable over JP '265 and JP '897, whether taken individually or collectively.

The rejection also takes the position that JP '897 teaches applying the short carbon fibers to the catalytic layer. However, there is no such disclosure of application of short carbon fibers of JP '897 to the catalytic layer. Instead, the short carbon fibers are applied to the surface of the gas diffusion layer. As a consequence, the explanation which bridges between a binder used in the catalytic layer of JP '265 and the carbon fibers and binder in the gas diffusion layer of JP '897 cannot be made. Thus, yet another aspect of the rejection is inapplicable to the claims.

By way of summary, the amendments to Claim 15 and the remarks set forth above make it

clear that the invention revolves around a porous conductive sheet which is a gas diffusion layer in a fuel cell and is not a fuel cell body or a fuel cell itself. Moreover, the porous conductive sheet/gas diffusion layer is not a catalyst layer that is used to form a current collector that is used to form a fuel cell. There are great differences between JP '265 and JP '897 and neither disclosure teaches or suggests utilization of the highly deformable property of expanded graphite particles together with the inorganic electrically conductive fibers such as carbon fibers. Accordingly, even if one of ordinary skill in the art makes the hypothetical combination of the short carbon fibers of JP '897, the resulting structure would be a gas diffusion layer of JP '265 having expanded graphite particles (previously treated with a pore forming agent) covered on one surface with conductive carbon fibers intertwined with each other. This is not what the Applicants claim in any of their independent claims and, as a result, the rejection must fall. Withdrawal of the rejection based on the hypothetical combination of JP '897 with JP '265 is accordingly respectfully requested.

In light of the foregoing, the Applicants respectfully submit that the entire Application is now in condition for allowance, which is respectfully requested.

Respectfully submitted,

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